

**CLAIMS:**

1. An energy-curable coating composition comprising a water-soluble or water-dispersible binder capable of being polymerised by exposure to a source of radiation, a particulate electrically conductive material, and water as a non-reactive diluent, and, if necessary, a photoinitiator, the composition, when cured, having a resistivity no greater than 1 ohm/square, as measured by ASTM F1896-98.
2. A composition according to Claim 1, in which the binder comprises at least a polymerisable monomer, prepolymer or oligomer capable of polymerisation by radiation and including at least one component which is water-soluble or water-dispersible.
3. A composition according to Claim 2, in which the binder comprises a water-soluble or water-dispersible oligomer or prepolymer capable of being polymerised by radiation and/or a water-soluble monomer capable of being polymerised by radiation, and optionally a water-insoluble monomer capable of being polymerised by radiation.
4. A composition according to Claim 3, in which the binder comprises:
  - (a) a water-soluble or water-dispersible oligomer or prepolymer capable of being polymerised by radiation,
  - (b) a water-soluble monomer capable of being polymerised by radiation,
  - (c) a water-insoluble monomer capable of being polymerised by radiation,
  - (d) a particulate electrically conductive material,
  - (e) water as a solvent or dispersant, and
  - (f) optionally a photoinitiator.
5. A composition according to any one of Claims 1 to 4, in which the binder comprises a water-soluble or water-dispersible urethane, polyester or epoxy resin containing acrylate ester groups and/or residues.
6. A composition according to Claim 4, in which said water-soluble or water-dispersible oligomer or prepolymer (a) is a water-soluble or water-dispersible urethane, polyester or epoxy resin containing acrylate ester groups and/or residues.

7. A composition according to any one of Claims 1 to 6, in which the binder comprises an ester of acrylic or methacrylic acid with polyethylene glycol or with a mono-, di-, tri-, or tetra- hydric alcohol derived by ethoxylating a mono-, di-, tri-, or tetra- hydric aliphatic alcohol of molecular weight less than 200 with ethylene oxide.
8. A composition according to Claim 4, in which said water-soluble monomer (b) is an ester of acrylic or methacrylic acid with polyethylene glycol or with a mono-, di-, tri-, or tetra- hydric alcohol derived by ethoxylating a mono-, di-, tri-, or tetra- hydric aliphatic alcohol of molecular weight less than 200 with ethylene oxide.
9. A composition according to any one of Claims 1 to 8, in which the binder includes an acrylate or methacrylate ester of a mono-, di-, tri-, tetra-, penta-, or hexa- hydric alcohol preferably having a molecular weight of less than 300.
10. A composition according to Claim 4, in which said water-insoluble monomer (c) is an acrylate or methacrylate ester of a mono-, di-, tri-, tetra-, penta-, or hexa- hydric alcohol preferably having a molecular weight of less than 300.
11. A composition according to any one of the preceding Claims, in which said electrically conductive material is a metal or metal oxide.
12. A composition according to Claim 11, in which said metal is silver, copper, nickel, tin, or platinum, or a mixture or alloy including at least one of these metals.
13. A composition according to any one of Claims 4, 6, 8 and 10, in which said water-soluble or water-dispersible oligomer or prepolymer (a) is present in an amount of from 2 to 15% by weight of the total composition.
14. A composition according to any one of Claims 4, 6, 8, 10 and 13, in which said water-soluble monomer (b) is present in an amount of from 2 to 10% by weight of the total composition.
15. A composition according to any one of Claims 4, 6, 8, 10, 13 and 14, in which said water-insoluble monomer (c) is present in an amount of from 1 to 8% by weight of the total composition.
16. A composition according to any one of Claims 4, 6, 8, 10, 13 and 14, in which said conductive material (d) is present in an amount such that the weight ratio of (d) to (a) plus (b) plus (c) is at least 2:1.

17. A composition according to Claim 16, in which said ratio is at least 3:1.
18. A composition according to Claim 17, in which said ratio is no greater than 6:1.
19. A composition according to any one of the preceding Claims, in which said conductive material is present in an amount of from 30 to 90% by weight of the total composition.
20. A composition according to any one of Claims 1, 2, 3, 5, 7, 9, 11 and 12, in which said conductive material is present in an amount of at least 35% by weight of the total composition.
21. A composition according to Claim 20, in which said conductive material is present in an amount of at least 40% by weight of the total composition.
22. A composition according to any one of the preceding Claims, in which said water is present in an amount of from 1 to 60% of the total composition.
23. A composition according to Claim 22, in which said water is present in an amount of from 1 to 40% of the total composition.
24. A composition comprising:
  - (a) from 2 to 15%, more preferably from 4 to 14%, by weight of a water-soluble or water-dispersible oligomer or prepolymer capable of being polymerised by radiation,
  - (b) from 2 to 10%, more preferably from 2 to 9%, by weight of a water-soluble monomer capable of being polymerised by radiation,
  - (c) from 1 to 8% by weight, more preferably from 3 to 7% by weight, of a water-insoluble monomer capable of being polymerised by radiation,
  - (d) sufficient of a particulate electrically conductive material that the ratio of said electrically conductive material to components (a), (b) and (c) is at least 2:1, preferably at least 3:1,
  - (e) from 1 to 60%, more preferably from 1 to 40%, by weight of water as a non reactive diluent, and
  - (f) optionally from 0.5 to 10%, more preferably from 1 to 5%, by weight of a photoinitiator,the composition, when cured, having a resistivity no greater than 1 ohm/square, as measured by ASTM F1896-98.

25. A composition according to any one of the preceding Claims, having, when cured, a resistivity no greater than  $10^{-1}$  ohm/square, as measured by ASTM F1896-98.
26. A composition according to any one of the preceding Claims, having, when cured, a resistivity no greater than  $10^{-2}$  ohm/square, as measured by ASTM F1896-98.
27. A process for producing a printed electrically conductive coating, in which a composition according to any one of the preceding Claims is printed onto a substrate, and is then energy cured by exposure to a source of actinic radiation.
28. A process according to Claim 27, in which said radiation is ultraviolet or electron beam.